

# NASA TECH BRIEF



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## System for Measuring Roundness and Concentricity of Large Tanks

Equipment has been under development for measuring the roundness and concentricity of large, massive tanks. The equipment includes a 34-foot rotary table, a variable reluctance displacement transducer, an electronics console, a digital computer, and a 5-foot plotter used for final data display. Operation of the system is relatively simple and straightforward. Test results indicate that a measurement accuracy of 0.003 inch is readily attainable on a 34-foot diameter ( $7.36 \times 10^{-4}$  percent accuracy).

In making measurements on a large tank positioned on the rotary table, the variable reluctance transducer is positioned against the tank through a precisely ground cam. As the rotary table moves the tank past the cam, any deviation from a preset zero reference point correspondingly changes the reluctance of the transducer. The resultant output voltage, corresponding to the deviation, is fed through a signal conditioning amplifier to a calibration panel. The output from the calibration panel is a direct analog in millivolts per inch of deviation. This analog voltage is passed to a digital voltmeter where the signal is displayed as inches of deviation and processed into a binary coded decimal format. While these measurements are being made, an angular readout unit displays 0.1-degree increments of rotation of the rotary table. Data from the readout unit are fed to a logic panel and to a pre-programmable counter. The counter may be programmed to allow readings at any multiple of degrees or tenths of degrees, enabling the inspector to make

from 1 to 36,000 measurements per rotation of the table. The counter also supplies speed information to the central logic system.

The measurement data are coded on tape, giving the deviation of any specific point, and the rotational speed of the table at the time the reading was taken. The taped data are converted into an acceptable form for the large plotter. A pattern of the tank is then plotted showing all deviations from the reference point.

To measure the vertical concentricity of the tank, it is only necessary to take a set of readings at two or more axially perpendicular planes through the tank and plot the resultant circles on the large plotter.

### Note:

A related system of measuring linear and angular dimensions on large tanks is described in Tech Brief 67-10214. Inquiries may also be directed to:

Technology Utilization Officer  
Marshall Space Flight Center  
Huntsville, Alabama 35812  
Reference: B68-10099

### Patent status:

No patent action is contemplated by NASA.

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